

REMARKS

Upon entry of this amendment, claims 1 and 19 will be amended, and claim 20 will be added, whereby claims 1-4, 6, 7, 9, 10, and 12-20 will be pending. Claims 1 and 19 are independent claims.

Reconsideration and allowance of the application are respectfully requested.

Response To Rejections Based Upon Prior Art

The following rejections are set forth in the Official Action:

(a) Claims 1-9 and 11-19 [apparently claims 1-8 and 11-19] are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (hereinafter Kim), U.S. Patent No. 5,645,596, in view of Ogawa et al. (hereinafter "Ogawa"), U.S. Patent No. 5,030,611, Saita et al. (hereinafter "Saita"), U.S. Patent No. 5,128,169, Shimp et al. (hereinafter "Shimp"), U.S. Patent No. 5,702,677, and Modern Ceramic Engineering (David W. Richerson, "Modern Ceramic Engineering", Marcel Dekker, Inc. 2nd Edition, 1992, pp. 519-522).

(b) Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim, U.S. Patent No. 5,645,596, in view of Ogawa, U.S. Patent No. 5,030,611, Saita, U.S. Patent No. 5,128,169, Shimp, U.S. Patent No. 5,702,677, and Modern Ceramic Engineering, as applied to claim 1, and further in view of JP 2-225382.

In response, Applicants note that claim 1 is directed to a method of manufacturing a ceramic composite, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface, and each of the at least two ceramic bodies being formed of a phosphoric compound;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, the bonding ceramic being formed of the same material as that of each ceramic body, said slurry being synthesized by merely adding a phosphoric compound to a calcium compound slurry;

applying the slurry to the bonding surface of at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to obtain fusing and growing of the primary particles of a bonding ceramic in the slurry during the sintering and bonding of the at least two ceramic bodies together.

Moreover, claim 19 is directed to a method of manufacturing a ceramic composite for a biocompatible material, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, said slurry containing no [in the absence of] organic components therein for preventing elution of organic components into a human body ;

applying the slurry to the bonding surface of the at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to obtain fusing and growing of the primary particles of a bonding ceramic in the slurry during the sintering and bonding of the at least two ceramic bodies together.

Applicants' method recited in independent claim 1 includes, amongst other features, that each of the at least two ceramic bodies is formed of a phosphoric compound and the bonding ceramic is formed of the same material as that of each ceramic body. In other words, amongst the other features recited in claim 1, claim 1 includes that the ceramic bodies and the bonding ceramic are formed of a phosphoric compound, and the bonding ceramic is the same material as the ceramic body. This makes it possible to prevent boundary surface (interface) from being formed between sintered ceramic bodies, so that the bonding strength of the ceramic composite can be enhanced or improved as disclosed in Applicants' originally filed application in the last paragraph of page 13 of the specification.

In particular, as disclosed in Applicants' originally file specification, at page 13, last paragraph, and page 14, first paragraph:

When the bonding ceramic in the slurry which is constituted from the same material as that of the ceramic bodies is used to bond the ceramic bodies together, it becomes possible to prevent boundary surface (interface) from being formed between the sintered ceramic bodies. Thus, the bonding strength of the ceramic composite can be enhanced or improved.

In this connection, the ceramic materials which is the same as those for the above-mentioned ceramic bodies may be used for a material for the bonding ceramics.

In contrast. Kim does not teach or suggest the details of the slurry. Kim apparently merely discloses at column 5, lines 25-26, that the slurry is an apatite slurry. Kim is silent as to whether the

ceramic material of the slurry is the same as the ceramic material for the dried dense material and/or the dried porous material. Moreover, Kim does not teach nor suggest the desirability of the ceramic material of the slurry being the same as the ceramic material of the ceramic bodies. In fact, following the disclosure of Kim, one having ordinary skill in the art would not be motivated to modify the apatite slurry to arrive at Applicants' disclosed and claimed invention.

The remaining documents utilized in the rejections do not overcome the deficiencies of Kim. In particular, the slurry disclosed in Ogawa contains two or more ceramic materials, and therefore does not teach nor suggest that each of the at least two ceramic bodies is formed of a phosphoric compound, and that the bonding ceramic is formed of the same material as that of each ceramic body.

Ogawa is different from Applicants' invention in that, amongst other features, Ogawa does not teach or suggest the slurry of the present invention in which the bonding ceramic is the same as the ceramic bodies and is formed of a phosphoric compound.

Moreover, Ogawa does not teach or suggest use of the slurry as a binder for bonding two or more ceramic bodies. Ogawa is directed to the formation of porous ceramic materials from slurries. Therefore, one having ordinary skill in the art would not have been motivated to modify Kim based upon the disclosure of Ogawa. In any event, even if for the sake of argument Kim and Ogawa were combined, the instantly claimed invention would not be present, because any combination of Kim and Ogawa would not, amongst other features of Applicants' claim 1, provide the same bonding ceramic as that of ceramic bodies to be bonded as claimed in the present invention.

Saita is directed to a method for forming hydroxyapatite coating film on a surface of a substrate which is useful for an implant material in view of the excellent affinity of the coating film to a living body. Saita is not directed to a method of manufacturing a ceramic composite by interposing a slurry between two ceramic bodies in the manner according to Applicants' disclosed and claimed invention. Accordingly, one having ordinary skill in the art would not have been motivated to modify Kim based upon the disclosure of Saita.

The portion of Shimp utilized in the rejection simply states that, "Binders may interfere with the sintering process, even if organic binders which leave no mineral residue upon firing are used". The reference to binders in Shimp appears to be directed to the use of binders in an agglomeration process for producing hydroxyapatite particles. Such disclosure does not provide any motivation for modifying a process as disclosed in Kim which is directed to the use of an apatite slurry for bonding ceramic bodies. Accordingly, one having ordinary skill in the art would not have been motivated to modify Kim based upon Shimp to arrive at Applicants' disclosed and claimed invention. Moreover, any combination of these documents would not arrive at Applicants' disclosed and claimed invention.

Modern Ceramic Engineering is also directed to the formation of ceramic powders and sintering characteristics and, similarly to the other documents discussed above, does not provide any motivation for modifying Kim. Moreover, any combination of Kim and Modern Ceramic Engineering would not arrive at Applicants' disclosed and claimed invention.

Accordingly, at least independent claim 1 is patentable over the prior art of record.

Moreover, independent claim 19 is directed, amongst other features, to a method of manufacturing a ceramic composite for a biocompatible material, which includes a slurry in which primary particles of a bonding ceramic are dispersed, said slurry containing no organic components therein for preventing elution of organic components into a human body, and applying the slurry to the bonding surface of the at least one of the ceramic bodies to be bonded.

Thus, for similar reasons to those stated above, it would not have been obvious to modify the disclosure of Kim with any of Ogawa which is directed to the formation of particles, Saita which is directed to producing a film, Shimp which is directed to the formation of particles, and Modern Ceramic Engineering which is directed to the formation of powders and sintering.

Applicants respectfully submit that the only teaching or suggestion that would lead one having ordinary skill in the art to arrive at Applicants' invention is within Applicants' disclosure, and the use of such disclosure by the Examiner is improper. In order to support the conclusion that the claimed invention is either anticipated or rendered obvious over the prior art, the prior art must either expressly or inherently teach the claimed invention or the Examiner must present a convincing line of reasoning why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. Ex parte Clapp, 227 U.S.P.Q. 972 (B.O.A. 1985).

There is absolutely no convincing line of reasoning present here that would lead one having ordinary skill in the art to modify the apatite slurry of Kim with any of the disclosures of the remaining documents utilized in the rejections. In this regard, the Examiner has merely referred to the slurries disclosed in the documents, but has not addressed the issue of why one having ordinary

skill in the art would modify the slurry of Kim based upon the unrelated disclosures of the other documents. Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 U.S.P.Q.2d 1525 (CAFC 1990).

Additionally, each of the dependent claims is patentable over the prior art of record in view of the fact that each of these dependent claims includes the limitations of independent claim 1. Moreover, each of the dependent claims is patentable over the prior art of record because it would not have been obvious to one having ordinary skill in the art to incorporate such dependent claim features into the invention as more broadly recited in independent claim 1.

Applicants point out that this is particularly true with respect to claim 10, which recites a method of manufacturing the ceramic composite as claimed in Claim 1, wherein the particles of the binding ceramic have an average grain size of 0.05 to 0.5 μm . Thus, claim 10 defines subject matter which is even more non-obvious than the preceding claims. By employing a bonding ceramic comprised of ceramic particles having the recited small particle size, the ceramic particles enter pores of the ceramic bodies to be bonded, thus making it possible to bond the bonding surfaces of the ceramic bodies more firmly. As a result, a boundary surface becomes almost non-existent, if at all present, between the ceramic bodies, thereby enabling the obtention of a ceramic composite having higher bonding strength between the ceramic bodies.

Still further, Applicants note that newly presented claim 20 further defines independent claim 19 by reciting that the bonding ceramic is formed of the same material as that of each ceramic body. Accordingly, this claim is also allowable for the reasons set forth above.

In view of the above, the 35 U.S.C. 103 rejections should be withdrawn as improper, and all of the claims should be indicated as allowable over the prior art.

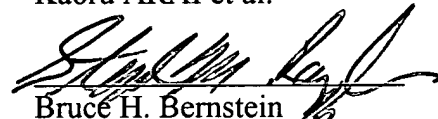
CONCLUSION

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims.

Applicants therefore respectfully request that an early indication of allowance of the application be indicated by the mailing of the Notices of Allowance and Allowability.

Should the Examiner have any questions regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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APPENDIX**Marked-Up Copy Of Amended Claims 1 and 19**

1. (Thrice Amended) A method of manufacturing a ceramic composite, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface, and each of the at least two ceramic bodies being formed of a calcium phosphate-based compound;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, the bonding ceramic being formed of the same material as that of each ceramic body, said slurry being synthesized by merely adding a phosphoric compound to a calcium compound slurry;

applying the slurry to the bonding surface of at least one of the ceramic bodies to be bonded;
and

sintering the ceramic bodies between which the slurry has been interposed to obtain fusing and growing of the primary particles of a bonding ceramic in the slurry during the sintering and bonding of the at least two ceramic bodies together.

6. (Amended) The method of manufacturing the ceramic composite as claimed in claim [5] 1, wherein at least one of the ceramic bodies is composed of calcium phosphate-based compounds with a Ca/P ration of 1.0 to 2.0.

7. (Amended) The method of manufacturing the ceramic composite as claimed in claim [5] 1, wherein the calcium phosphate-based compounds include hydroxyapatite.

12. (Amended) The method of manufacturing the ceramic composite as claimed in claim [11] 1, wherein the bonding ceramic is composed of calcium phosphate-based compounds with a Ca/P ratio of 1.0 to 2.0.

13. (Amended) The method of manufacturing the ceramic composite as claimed in claim [11] 1, wherein the calcium phosphate-based compounds include hydroxyapatite.

19. (Twice Amended) A method of manufacturing a ceramic composite for a biocompatible material, the method comprising:

preparing at least two ceramic bodies to be bonded together, each of the at least two ceramic bodies having a bonding surface;

preparing a slurry in which primary particles of a bonding ceramic are dispersed, said slurry containing no [in the absence of] organic components therein for preventing elution of organic components into a human body ;

applying the slurry to the bonding surface of the at least one of the ceramic bodies to be bonded; and

sintering the ceramic bodies between which the slurry has been interposed to obtain fusing and growing of the primary particles of a bonding ceramic in the slurry during the sintering and bonding of the at least two ceramic bodies together.